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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,795	11/13/2003	Jeom-Sik Yang	P2061US	4207
8968	7590	05/31/2006	EXAMINER	
GARDNER CARTON & DOUGLAS LLP ATTN: PATENT DOCKET DEPT. 191 N. WACKER DRIVE, SUITE 3700 CHICAGO, IL 60606			VAN, LUAN V	
			ART UNIT	PAPER NUMBER
			1753	

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/713,795

Applicant(s)

YANG ET AL.

Examiner

Luan V. Van

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 9, 2006 has been entered.

Response to Amendment

Applicant's amendment of May 9, 2006 does not render the application allowable.

Status of Objections and Rejections

The rejection of claims 1-9 under 35 USC 1 112, first paragraph, is withdrawn.

All other rejections from the previous office action are maintained.

New grounds of rejection are necessitated by the amendments:

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claims 1 and 6 recites the limitation of "IPC TM 650 2.2.17A" which is a standard of measurement. Since standards change over time, the recitation of IPC TM 650 2.2.17A is indefinite unless the date of the published standard of measurement or a definition of the standard is provided. However, the claims cannot contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. It is suggested the applicants cancel the limitation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Dahms '159.

Regarding claims 1, 4 and 5, Dahms '159 teach an electrolyte solution containing sulfuric acid and copper sulfate (column 4 lines 49-60), based on the 1-liter electrolyte solution, comprising: 2-20 mg of bis-w-sulfopropyl-disulfide disodium salt compound (table 2); 5-20000 mg of a poly akylene glycol-type surfactant (column 3 lines 3-17); and 20-150 mg of chlorine ion (column 4 lines 49-60). These ranges of concentration

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are within those of the instant claims. With respect to the current density and surface roughness limitations in the preamble of claim 1, these limitations are not given patentability weight, because the claim is directed to an electrolyte solution and, thus, such limitations constitute intended use of the invention.

Regarding claim 2, Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66).

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Dahms et al. '711.

Regarding claims 1 and 4-5, Dahms et al. '711 teach an electrolyte solution containing sulfuric acid and copper sulfate (column 8 lines 5-14), based on the 1-liter electrolyte solution, comprising: 0.5-400 mg of bis-w-sulfopropyl-disulfide disodium salt compound (column 8 lines 40-45; table 2); 5-20000 mg of a poly alkylene glycol-type surfactant (column 8 lines 40-45; table 1); and 10-180 mg of chlorine ion (column 8 lines 5-14). These ranges of concentration are within those of the instant claim. Likewise, with respect to the current density and surface roughness limitations in the preamble of claim 1, these limitations are not given patentability weight, because the claim is directed to an electrolyte solution and, thus, such limitations constitute intended use of the invention.

Regarding claim 3, Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Dahms et al. '711 .

Dahms '159 teach the solution as described above in addressing claims 1. The difference between the reference to Dahms '159 and the instant claims is that the reference does not explicitly teach an electrolyte solution containing a thiourea derivative.

Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms '159 by substituting

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the nitro compound with the thiourea derivatives of Dahms et al. '711, because using thiourea derivatives for depositing copper would yield a uniform thickness copper coating.

Claims 6, 7 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Clouser et al. '887.

Regarding claims 6 and 9, Dahms '159 teach an electrolytic method comprising the steps of preparing an electrolyte solution comprising: 2-20 mg/L of bis-w-sulfopropyl-disulfide disodium salt compound (table 2); 5-20000 mg/L of a poly aklylene glycol-type surfactant (column 3 lines 3-17); and 20-150 mg/L of chlorine ion (column 4 lines 49-60); and generating the electrolytic copper foil (example 6). The copper foil is inherently deposited on a cathode, since positive metal ions are inherently attracted to the negative electrode, and electrochemical deposition by definition requires electricity to flow between an anode and a cathode through the electrolyte solution.

Dahms '159 differs from the instant claims in that Dahms '159 does not explicitly disclose the roughness of the copper foil or the specific current density of the instant claim (claim 6).

Clouser et al. '887 teach copper foils produced by a similar sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm (column 5 lines 26-30), which is within the range of the instant claims. Clouser et al. '887 also teach electrodepositing the copper foil using a current density of 500-2000 amps per square foot, or about 50-200 A/dm^2 , which is within the range of the instant claims.

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dahms '159 by electrodepositing a copper foil having a roughness of less than 2.0 μm as taught by Clouser et al. '887, because such copper foil would be suitable for use in flexible circuits manufacture and would have high fatigue ductility as taught by Clouser et al. '887 (column 5 lines 58-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have further modified the method of Dahms '159 by using the current density of Clouser et al. '887, because such current density would produce high fatigue ductility electrodeposited copper foils.

Regarding claim 7, Dahms '159 teach an electrolytic method containing a dithiocarbamic acid (column 2 lines 64-66).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Clouser et al. '887, and further in view of Dahms et al. '711 .

Dahms '159 and Clouser et al. '887 teach the method as described above in addressing claim 6. The difference between the references and the instant claim is that the references do not explicitly teach an electrolyte solution containing a thiourea derivative.

Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms '159 and Clouser et al.

'887 by substituting the nitro compound with the thiourea derivatives of Dahms et al. '711, because using thiourea derivatives for depositing copper would yield a uniform thickness copper coating.

Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Dahms '159.

Dahms et al. '711 teach the solution as described above in addressing claims 1. The difference between the reference to Dahms et al. '711 and the instant claims is that the reference does not explicitly teach an electrolyte solution containing a dithiocarbamic acid.

Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66) is suitable for depositing copper to yield a shiny and tear-free copper coating.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms et al. '711 by substituting the organic sulfur compound with a dithiocarbamic acid as taught by Dahms '159, because a skilled artisan would be able to select from among known organic sulfur compounds that are suitable for depositing copper, and because using a dithiocarbamic acid for depositing copper would yield a shiny and tear-free copper coating.

Claims 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Clouser et al. '887.

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Regarding claims 6 and 9, Dahms et al. '711 teach an electrolytic method comprising the steps of preparing an electrolyte solution comprising: 0.5-400 mg/L of bis-w-sulfopropyl-disulfide disodium salt compound (column 8 lines 40-45; table 2); 5-20000 mg/L of a poly alkylene glycol-type surfactant (column 8 lines 40-45; table 1); and 10-180 mg/L of chlorine ion (column 8 lines 5-14); and generating the electrolytic copper foil (example 1). The copper foil is inherently deposited on a cathode, since positive metal ions are inherently attracted to the negative electrode, and electrolytic deposition by definition requires electricity to flow between an anode and a cathode through the electrolyte solution.

Dahms et al. '711 differ from the instant claims in that Dahms et al. '711 do not explicitly disclosed the roughness of the copper foil or the specific current density of the instant claim (claim 6).

Clouser et al. '887 teach copper foils produced by a similar sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm (column 5 lines 26-30), which is within the range of the instant claims. Clouser et al. '887 also teach electrodepositing the copper foil using a current density of 500-2000 amps per square foot, or about 50-200 A/dm^2 , which is within the range of the instant claims.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dahms '711 by electrodepositing a copper foil having a roughness of less than 2.0 μm as taught by Clouser et al. '887, because such copper foil would be suitable for use in flexible circuits manufacture and

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would have high fatigue ductility as taught by Clouser et al. '887 (column 5 lines 58-65). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have further modified the method of Dahms '711 by using the current density of Clouser et al. '887, because such current density would produce high fatigue ductility electrodeposited copper foils.

Regarding claim 8, Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Clouser et al. '887, and further in view of Dahms '159.

Dahms et al. '711 and Clouser et al. '887 teach the method as described above in addressing claim 6. The difference between the reference to Dahms et al. '711 and the instant claims is that the reference does not explicitly teach an electrolyte solution containing a dithiocarbamic acid.

Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66) is suitable for depositing copper to yield a shiny and tear-free copper coating.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms et al. '711 and Clouser et al. '887 by substituting the organic sulfur compound with a dithiocarbamic acid as taught by Dahms '159, because a skilled artisan would be able to select from among known organic sulfur compounds that are suitable for depositing copper, and because

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using a dithiocarbamic acid for depositing copper would yield a shiny and tear-free copper coating.

Response to Arguments

Applicant's arguments filed May 9, 2006 have been fully considered but they are not persuasive.

In the arguments presented on page 5 of the amendment, the applicant argues that Dahms '159 and Dahms et al. '711 do not teach the current density of the currently amended claim. The examiner acknowledges that the current density of Dahms '159 and Dahms et al. '711 do not overlap with the range of the instant claim. However, as stated in the office action above, with respect to the current density and surface roughness limitations in the preamble of claim 1, these limitations are not given patentability weight, because the claim is directed to an electrolyte solution and, thus, such limitations constitute an intended use of the invention.

With respect to claims 6-9 directed to a method of forming a copper foil, Clouser et al. '887 teach electrodepositing the copper foil using a current density of 500-2000 amps per square foot, or about 50-200 A/dm², which is within the range of the instant claims. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dahms '159 or Dahms et al. '711 by using the current density of Clouser et al. '887, because such current density would produce high fatigue ductility electrodeposited copper foils.

The applicant further argues that Dahms '159 and Clouser et al. '887 are not properly combinable because of the different range of concentrations of organic additives. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As the Court of Appeals for the Federal Circuit has stated, there are three possible sources for motivation to combine references in a manner that would render claims obvious. These are: (1) the nature of the problem to be solved; (2) the teaching of the prior art; and (3) the knowledge of persons of ordinary skill in the art. *In re Rouffet*, 47 U.S.P.Q.2d 1,453, 1,458 (Fed. Cir. 1998). In this case, the references are all directed to a method and composition for electroplating a uniform and ductile copper foil. Moreover, Dahms '159 is modified using Clouser et al. '887 for the surface roughness of the copper foil and for the current density, and therefore differences in the concentrations of organic additives are irrelevant. The combination of these references is deemed proper for the reasons stated above.

Conclusion

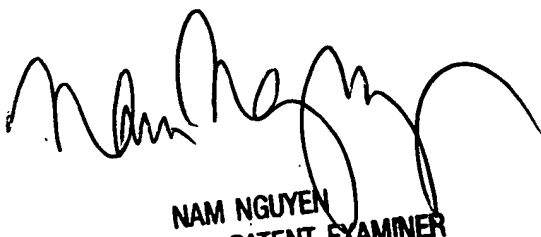
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LWV
May 25, 2006



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